Section 2
Overview of Water Supply and Demand in King County

This section provides a summary of water delivery systems, sources of supply, and projected demands in King County (County). First, it provides an overview of the water delivery systems. Water is delivered by nearly 1,900 individual public water systems within the County. These range from tiny systems that serve only two households, to large utilities serving the vast majority of the population within the County. The various types of water systems are examined in terms of size, defined service areas, and location with respect to the County's Urban Growth Areas (UGAs).

Next, the different sources of water supply that produce water for use within the County are discussed. These include large regional supplies owned by Seattle Public Utilities (SPU), a smaller regional supply operated by the City of Auburn, local supplies owned by other utilities, and private wells serving individual households and businesses. Water Resource Inventory Areas (WRIAs), or watershed areas, are described briefly, and their locations shown with respect to major sources of supply. These are important in the context of watershed planning efforts currently underway in the region through either the State Salmon Recovery Act (House Bill 2496) or Watershed Planning Act (House Bill 2514).

Following the description of water supply sources, various regional water supply organizations are discussed. These organizations are key players in water resource management within the County and the region.

Finally, this section breaks down the County population into components served by the various sources of water. Continued growth projected for the County will put pressure on local sources of supply. A similar discussion is provided for the projected growth in water demands within the County, based on projections in the Central Puget Sound Regional Water Supply Outlook (Outlook). Overall, demand in King County is projected to grow from 212 million gallons per day (mgd) in year 2000, to 240 mgd in year 2020. Enhanced conservation efforts planned for much of the area within the County will help to address a significant portion of that need.

2.1 Types of Water Systems

Water is delivered to consumers in the County for distribution through a variety of public and private arrangements. These include public water systems, private supplies, and individual household wells. This section describes the various delivery systems (in contrast to the *sources* of water described in Section 2.2).

2.1.1 Legal and Regulatory Organization of Water Systems

"Public water systems" are defined in State law to include any water system that supplies water for human consumption, with the exception of systems serving a single household and certain on-farm systems. Public water systems are regulated under the following four categories:

- Group A Community
- Group A Transient Non-Community
- Group A Non-Transient Non-Community
- Group B

All of the Group A systems serve the public and are regulated under the federal Safe Drinking Water Act (SDWA). These systems have 15 or more connections, or serve 25 or more people on a regular basis. Generally, the Group A community systems serve cities, subdivisions, mobile-home parks, and other residential consumers (except those very small communities defined as Group B). For example, all of the water systems specifically identified in the Outlook are Group A systems (though many small Group A systems were not examined individually in the Outlook).

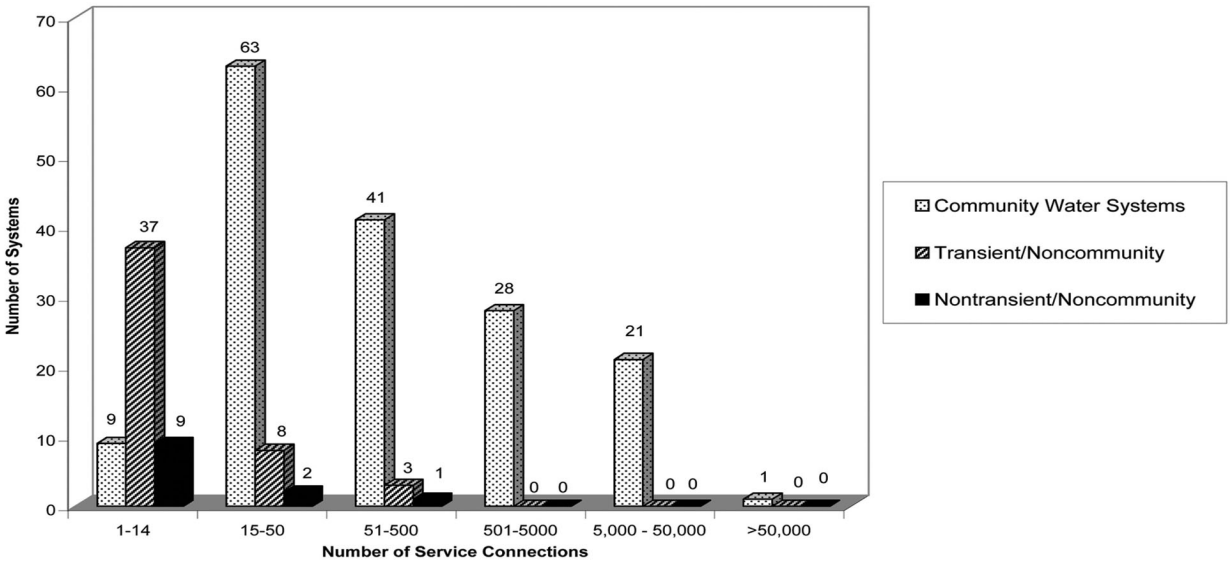
Group A non-community systems typically are self-supplied businesses, restaurants, hotels, campgrounds, schools, daycare facilities, parks, churches, fairgrounds, and other non-residential facilities. Transient non-community systems serve water during a more limited time of year than non-transient non-community systems.

Group B systems generally serve from 2 to 14 households. Group B systems are subject to certain State regulations and County ordinances, but are not regulated under the SDWA.

A more complete discussion of the various types of water systems is included in Appendix B. This Appendix also discusses the concept of "service connections" served by public water systems. Because of its emphasis on community supplies, the Consolidated Report focuses primarily on Group A Community systems and Group B systems. However, many of the solutions identified for community systems may also be applicable to non-community systems.

Within King County, there are 223 Group A water systems. Of these, 163 are Group A Community systems, and the remaining 60 are either Transient Non-Community systems or Non-Transient Non-Community systems. Exhibit 2-1 provides a breakdown of these systems by number of service connections. Appendix C lists all Group A systems in the County, and the number of connections served by each one.

Exhibit 2-1
Group A Public Water Systems, Grouped by Type and Number of Connections



Source: Washington State Department of Health Water Facilities Inventory, 2000

In addition to the Group A systems, there are 1,648 Group B water systems in the County, with a total of 6,305 service connections. Because of the volume of systems, and the relatively small amount of demand represented, these are not listed individually in this report. Additionally, individual, private wells serve approximately 23,000 households in the County (see Section 2.2.5).

2.1.2 Geographical Organization of Water Systems

Of the 223 Group A water systems in King County, 66 have defined "service areas," developed through a Coordinated Water System Plan (CWSP) or otherwise defined[1]. A utility's "service area" can be meant to describe the area to which the utility currently provides service (i.e., the area in which the utility has delivery infrastructure), or it can define the entire geographical area which the utility is authorized to serve and which neighboring utilities have agreed to. This report utilizes the latter definition in describing service areas. Exhibit 2-2 depicts the defined service areas for water systems in King County. This same exhibit also displays the locations of wells and springs associated with the remaining 157 Group A systems that do not have defined service areas [2]. Further discussion of service areas is provided in Section 6.4.2.

[1] There is an approved Coordinated Water System Plan for Vashon Island. It was approved by King County in 1991 and subsequently approved by the State Department of Health.
[2] The circular symbols on Exhibits 2-2 and 2-3 represent the center of a geographical area in which at least one well is located. Due to the variable nature of the data, the size of the areas identified range from one section (i.e., a square mile) to a quarter-quarter section (i.e., 40 acres).

Exhibit 2-3 displays the locations of wells and springs for Group B systems (see previous footnote).

The data used to prepare Exhibits 2-2 and 2-3 was obtained from the Department of Health's (DOH) Geographical Information Systems (GIS) mapping database, which contains different information than that found in the more comprehensive Drinking Water Automated Information Network (DWAIN). Most, but not all, systems listed in DWAIN have been mapped. Table 2-1 presents the number of small King County water systems listed in DWAIN, compared to the number present in the GIS database (as of October, 2000). Also presented in Table 2-1 is an analysis, based upon GIS information, of the location of small systems in relation to defined service areas for larger systems and Urban Growth Areas (UGAs), geographical areas defined in adopted city and county comprehensive land use plans as per the State Growth Management Act. Exhibit 2-4 presents the same information graphically.

The geographic location of small systems, in relation to larger systems and UGAs, is significant in developing a framework for dealing with water supply needs faced by such systems, as discussed in Section 6.4. Each geographic setting (i.e., in relation to UGA and service area boundaries) has unique regulatory requirements and limitations. Urban growth is directed to designated UGAs, in part by providing urban levels of water service. However, areas outside of UGAs may not receive urban levels of service, as growth in such places is encouraged to be of a non-urban nature. As discussed later in Section 6.4, location within or near defined service areas of larger utilities is important in that the first solution many failing small systems will likely pursue is connection to an existing utility having a defined service area.

Based on analysis of the maps presented in Exhibits 2-2 and 2-3, an assessment can be made of the degree to which areas outside UGAs are served by public water systems. Of the larger Group A systems covered by the Outlook, approximately 14 have service areas that extend outside UGAs. It is important to note, however, that while a service area defines the entire geographical area which a utility is authorized to serve, service is not necessarily provided by the utility to all customers within the service area. Some residents may be served by other existing Group A and Group B systems (which are non-expanding and not required by law to have defined service areas), or private wells.

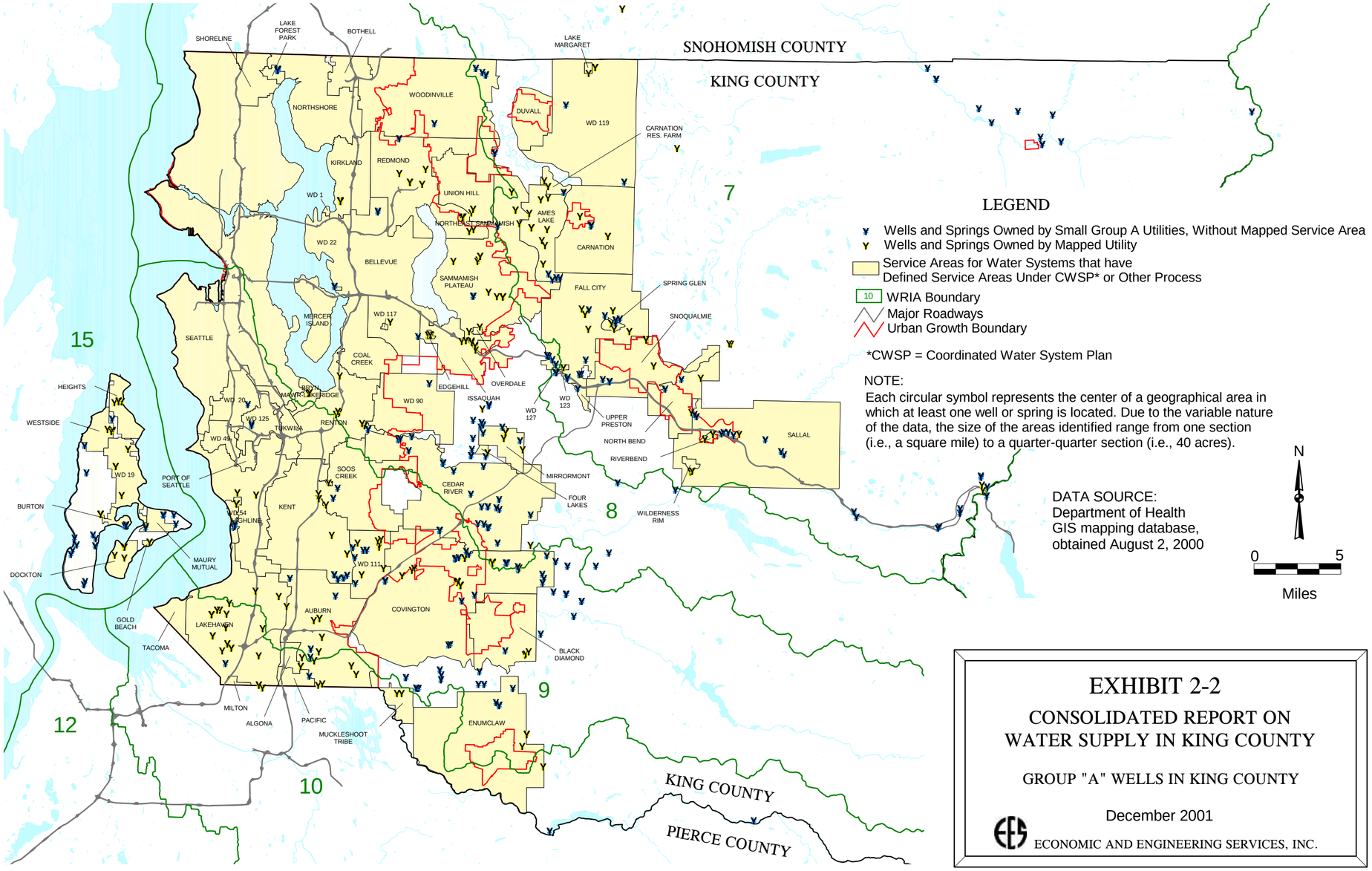


EXHIBIT 2-2

CONSOLIDATED REPORT ON WATER SUPPLY IN KING COUNTY

GROUP "A" WELLS IN KING COUNTY

December 2001

ECONOMIC AND ENGINEERING SERVICES, INC.

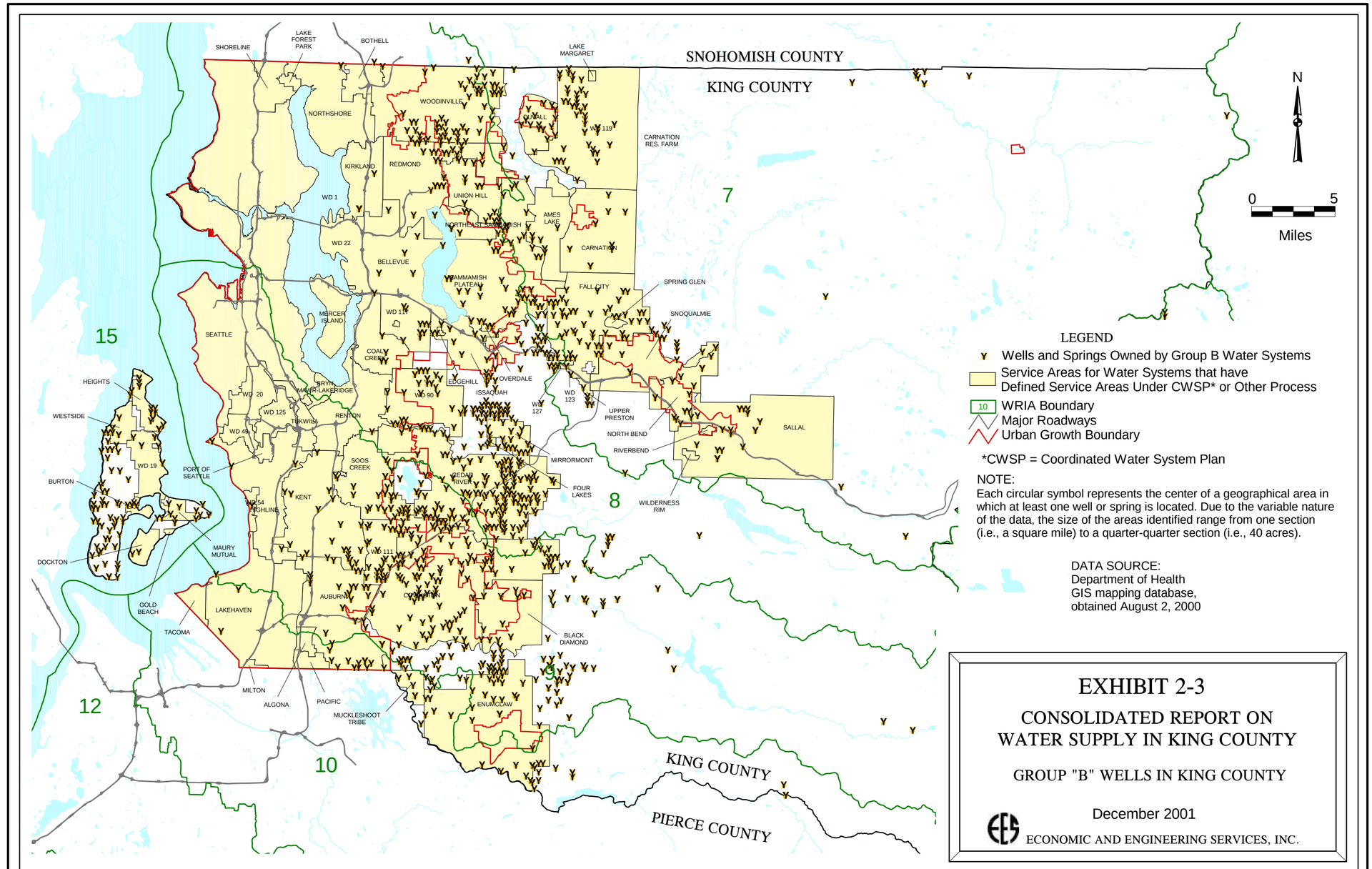
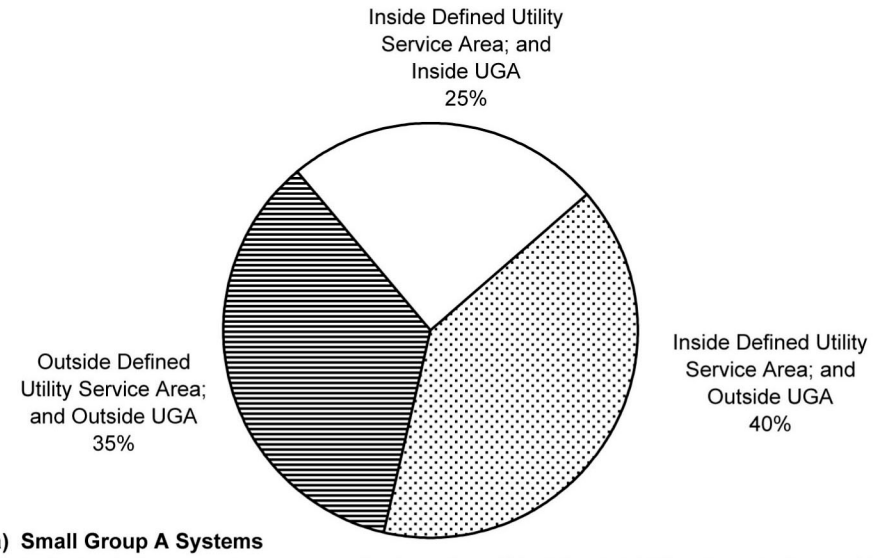
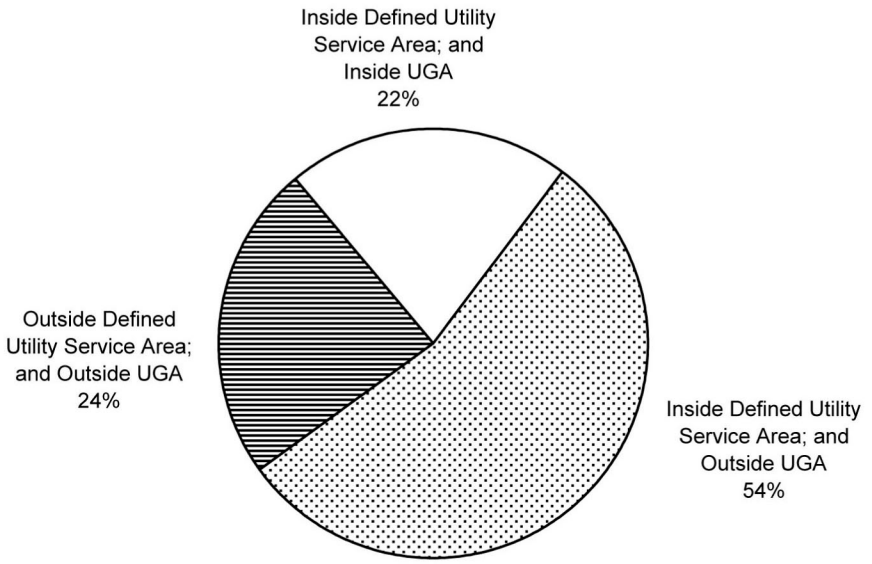

SNOHOMISH COUNTY
KING COUNTY
SHORELINE
LAKE FOREST PARK
BOTHELL
LAKE MARGARET
NORTHSHORE
WOODINVILLE
DUVALL
WD 119
CARNATION RES. FARM
KIRKLAND
REDMOND
WD 1
UNION HILL
NORTHEAST SAMMAMISH
AMES LAKE
CARNATION
WD 22
BELLEVUE
SAMMAMISH PLATEAU
FALL CITY
SPRING GLEN
SNOQUALMIE
WD 119
MERCER ISLAND
SEATTLE
COAL CREEK
HEIGHTS
WESTSIDE
BRYN MAWR-LAKERIDGE
EDGEHILL
OVERDALE
ISSAQUAH
WD 90
WD 20
WD 125
RENTON
TUKWILA
WD 49
WD 123
WD 127
UPPER PRESTON
NORTH BEND
RIVERBEND
SALLAL
MIRRORMONT
SOOS CREEK
CEDAR RIVER
WD 19
PORT OF SEATTLE
BURTON
KENT
WD 54
HIGHLINE
FOUR LAKES
WILDERNESS RIM
MAURY MUTUAL
DOCKTON
WD 111
AUBURN
OLYMPIAN
GOLD BEACH
LAKEHAVEN
TACOMA
BLACK DIAMOND
MILTON
ALGONA
PACIFIC
MUCKLESHOOT TRIBE
ENUMCLAW
KING COUNTY
PIERCE COUNTY
7
8
9
10
12
15
N
0
5
Miles
LEGEND
Wells and Springs Owned by Group B Water Systems
Service Areas for Water Systems that have Defined Service Areas Under CWSP* or Other Process
10 WRIA Boundary
Major Roadways
Urban Growth Boundary
*CWSP = Coordinated Water System Plan
NOTE:
Each circular symbol represents the center of a geographical area in which at least one well or spring is located. Due to the variable nature of the data, the size of the areas identified range from one section (i.e., a square mile) to a quarter-quarter section (i.e., 40 acres).
DATA SOURCE:
Department of Health
GIS mapping database,
obtained August 2, 2000
EXHIBIT 2-3
CONSOLIDATED REPORT ON
WATER SUPPLY IN KING COUNTY
GROUP "B" WELLS IN KING COUNTY
December 2001
ECONOMIC AND ENGINEERING SERVICES, INC.

Exhibit 2-4
Geographic Breakdown of Small Systems in King County



(a) Small Group A Systems
(Note: In total, these system account for less than 1% of the total King County demand.)



(b) Group B Systems
(Note: In total, these systems acount for about 1% of the total King County demand.)

In addition, approximately 109 smaller Group A systems (those without defined service areas) appear to be located outside UGAs (see Table 2-1). At least 1,139 Group B systems appear to be located outside UGAs. Due to the limited resolution available for plotting locations of smaller Group A and Group B systems, there are many additional Group A and Group B wells that appear to be located near a UGA boundary but cannot be placed definitively within or outside the UGA.

More than 98 percent of the land area within King County's UGA boundaries is located within the defined service areas of larger Group A Public Water Systems.

Table 2-1
Small Systems in King County, Comparison of Geographic Relationships and Data Sources

	Data Sources		Geographic Relationships		
Type of System	**Total Number of Systems, DWAIN[1]**	**Total Number of Systems, GIS Database[2]**	**Systems Inside Defined Service Areas[3] and UGA**	**Systems Inside Defined Service Areas[3], but Outside UGA**	**Systems Outside Defined Service Areas and UGA**
Group A Systems without Defined Service Area	157	145	36 (25%)	58 (40%)	51 (35%)
Group B Systems	1,648	1,451	312 (22%)	793 (54%)	346 (24%)
Total	**1,805**	**1,596**	**348 (22%)**	**851 (53%)**	**397 (25%)**

Footnotes:
(1) DWAIN = DOH Drinking Water Automated Information Network, a comprehensive database of information on drinking water systems in the State.
(2) GIS Database = DOH Geographical Information System Database, used to map the location of water system wells.
(3) Service areas are those for *larger* Group A systems (i.e., some of the small systems listed in this table are located within the service area designated by another, larger utility).

2.1.3 Characterization of Water Systems by Size

In King County, 51 public water systems serve approximately 94.5 percent of the population[3], and 1,805 small systems serve approximately 2.2 percent of the population[(4)]. The remaining 3.3 percent of the population utilizes private, individual household wells. The largest public water system in the County is SPU, which delivers water to customers in and around the City of Seattle. Approximately 74 percent of the County's population receives at least a portion of its water supply from SPU. SPU is the sole water provider for 64 percent of the population in the County; 35 percent through its direct retail connections and 29 percent through its fully-supplied wholesale customers. An additional 10 percent of the County population receives water both from SPU and another local source.

[3] The estimated 2000 population for King County is 1,755,422.

[(4)] There are also alternative ways to depict the share of the County served by different sources of supply, such as by land area served, and/or the number of connections served.

Beside SPU, an additional 26 utilities within the County each deliver water to at least 10,000 people in their retail service areas. These are arranged from largest to smallest in Table 2-2. Together, SPU and these 26 additional water systems deliver water to approximately 89 percent of the County population (see Section 2.4 for additional information). Exhibit 2-5 displays the share of King County population served by different sizes of water systems.

Table 2-2
Public Water Systems Distributing Water to at least 10,000 People (arranged by population served)(1)

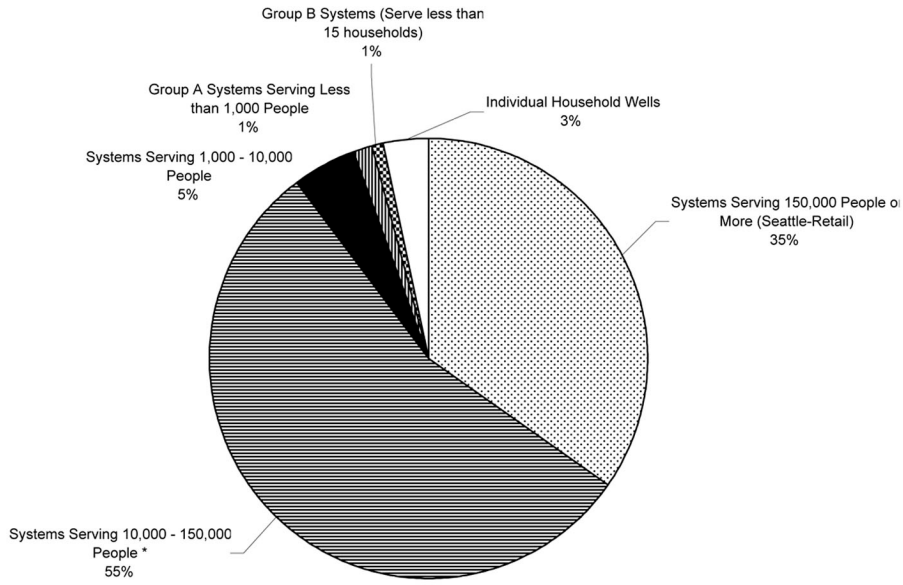
Seattle (Retail)	King County Water District 20
Bellevue	Shoreline
Lakehaven	Coal Creek
Northshore	Mercer Island
Highline	Cedar River
Soos Creek	Enumclaw
Kent	King County Water District 111
Renton	King County Water District 90
Redmond	King County Water District 45
Auburn	King County Water District 125
Woodinville	King County Water District 49
Covington	Bothell
Sammamish Plateau	Issaquah
Kirkland	

Source: Adapted from 2001 Central Puget Sound Regional Water Supply Outlook 1.
Footnote:
(1) For further information, see Table 2-8 in Section 2.4.

2.1.4 Characterization of Water Systems by Ownership

Another way in which public water systems may be characterized is by system ownership. Various entities, including governments (local, state, and federal) and private organizations (profit and non-profit), own the public water systems that serve King County. System ownership is important due to significant differences (i.e., regarding regulatory requirements, rate controls, access to capital funding, etc.) between the various types of ownership. Table 2-3 provides a summary of ownership. As shown in the table, approximately 66 percent of Group A and 99 percent of Group B public water systems in the County are privately owned. However, these are generally the smaller systems.

Exhibit 2-5
King County Population Served, Grouped by Size of Water System



* For list of systems in this category, see Table 2-2.

Sources: For larger systems, data adapted from Regional Water Suppply Outlook. For smaller systems, estimates based on Water Facilities Inventory. For individual household wells, value calculated for this report.

Table 2-3
Number of Public Water Systems by Type of Ownership in King County(1)

Ownership Type	Group A, Community	Group A, Non-Transient Non-Community	Group A, Transient Non-Community	Group B	Total
Local Government	54	2	2	11	69
State Government	1	0	7	5	13
Federal Government	1	0	6	2	9
Private, Profit	33	5	13	1,003	1,054
Private, Non-Profit	74	5	20	627	726
Total	**163**	**12**	**48**	**1,648**	**1,871**

Footnote:
(1) Data obtained from Department of Health Drinking Water Automated Information Network (DWAIN) database, 2000.

2.2 Sources of Supply

Water consumed in King County comes from several distinct sources. The main categories of water sources include the following:

- Major regional sources owned by SPU;
- Major regional sources owned by Tacoma Water, but serving only a limited population in the southwest corner of King County;

- Large local sources of supply that produce 10 mgd or more and serving limited areas within the County (these sources are owned and operated by the Cities of Auburn, Kent, and Renton, and by Lakehaven Utility District);
- Smaller local sources of supply that produce less than 10 mgd (these sources are owned and operated by many individual public water systems);
- Individual household wells;
- Privately-owned sources that produce water for private businesses, industry, or agriculture, and which typically do not serve residential communities (though there may be some exceptions).

Each of these categories is described further below.

2.2.1 Major Regional Sources of Water Owned by SPU (Cedar, Tolt, and Highline Wells)

SPU operates three major regional sources that are operated jointly to produce water for residents and businesses within Seattle and large areas of King County. They include the Cedar River system (approximately 70 percent of SPU supply), Tolt River system (29 percent), and Highline wells (1 percent). Their locations are displayed in Exhibit 2-6. Firm yield of these sources is summarized in Table 2-4. In the context of SPU's sources of supply, firm yield refers to the maximum level of annual average demand (taking into account the seasonal peaking profile of that demand) the utility's sources can meet on a reliable and sustainable basis.

Table 2-4
Firm Yield of Seattle Public Utilities' Supply Sources

Supply System	Firm Yield	Year When Demand (1) is Projected to Equal Firm Yield
Existing System with only Cedar River, South Fork Tolt River, Highline Wellfield, and Requirements of Cedar HCP.	160 MGD	2016
Existing System with the addition of Tolt Treatment Facility and Tolt Pipeline 2	171 MGD	2023
Existing System with additions listed above and participation in Tacoma's Second Supply Project	185 MGD	2031

Source: SPU 2001 Water System Plan Update, Public Review Draft, July 2000.

Footnote:

(1) SPU's forecast of water demand includes the incremental demand of 8 new or potential wholesale customers. It also reflects the expected impacts of the state plumbing code, the 1% Conservation Program, and additional conservation in the 10 years following the 1% Program that the City committed itself to as part of the Cedar River Habitat Conservation Plan. More recently, the City has agreed to further accelerate conservation investment in response to Initiative 63. The impact of conservation associated with Initiative 63 settlement has yet to be incorporated into the demand forecast.

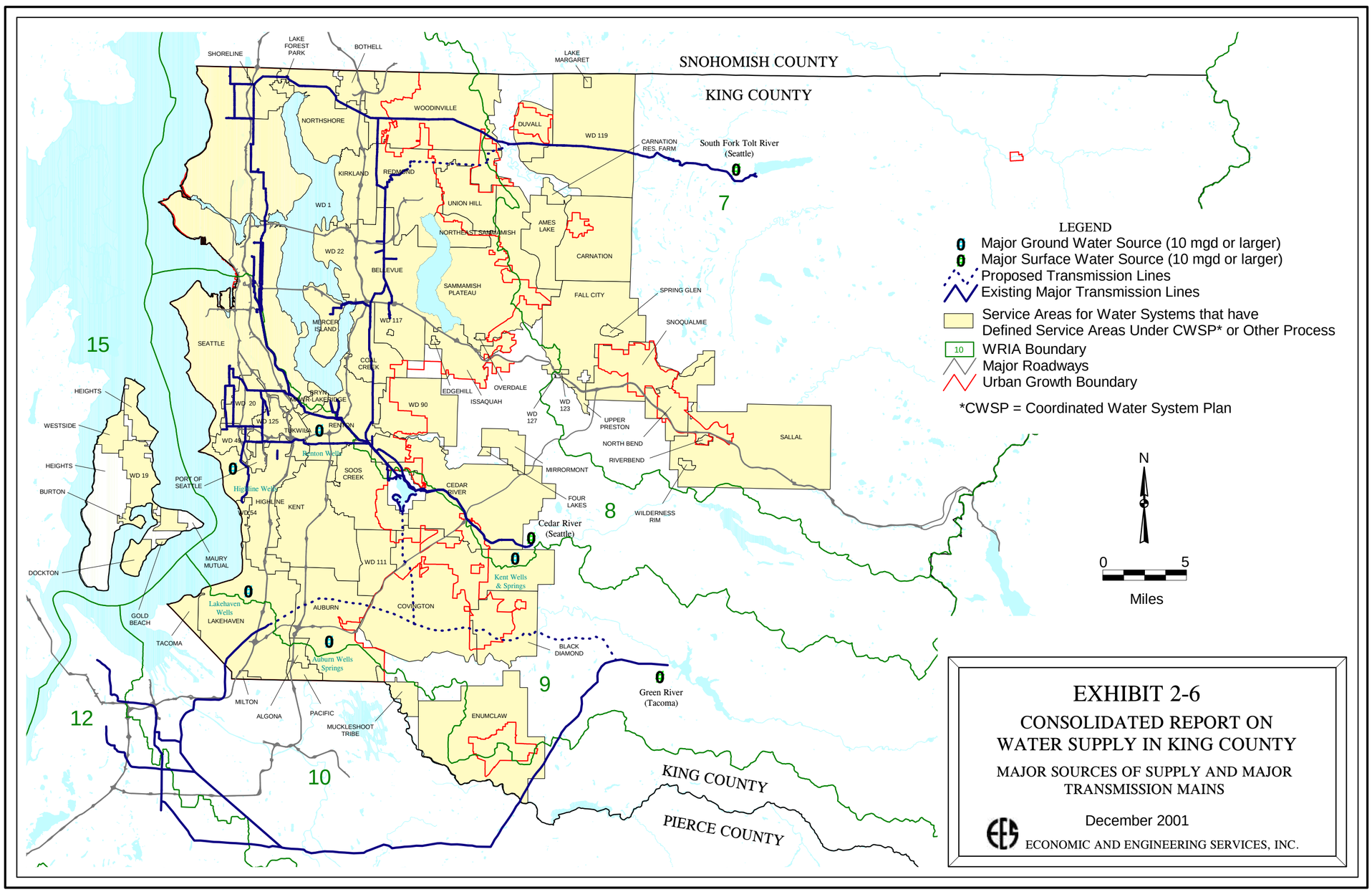


EXHIBIT 2-6

CONSOLIDATED REPORT ON WATER SUPPLY IN KING COUNTY

MAJOR SOURCES OF SUPPLY AND MAJOR TRANSMISSION MAINS

December 2001

ECONOMIC AND ENGINEERING SERVICES, INC.

SPU has been negotiating an agreement to participate in Tacoma's Second Supply Project on the Green River. As shown in Table 2-4, this would result in a significant increase in available supply, as well as enhancing operating flexibility and reliability. This project is discussed further in Section 4.4.2.

2.2.2 Major Regional Sources Owned by Tacoma Water

Tacoma Water produces water from the Green River system in King County (see Exhibit 2-6), and from wells in Pierce County. Most of Tacoma's supply is delivered to customers in Pierce County. However, Tacoma Water provides retail service to a small portion of southwest King County and sells water wholesale to Lakehaven Utility District and the City of Enumclaw.

2.2.3 Other Large Sources of Water in King County

Several of the large public water systems in King County have sources of supply that are capable of producing 10 mgd or more. Because of the magnitude of this capacity, the Outlook developed a specific description for each of these. These four ground water sources are owned and operated by the City of Auburn, City of Kent, Lakehaven Utility District, and City of Renton. Based on information provided by these four systems, the supplies are summarized in Table 2-5. Their locations are also shown in Exhibit 2-6.

Table 2-5
Additional Large Sources of Municipal, Potable Supply in King County

Source	Type	Water Rights		Average Annual Supply Available (mgd)
		Maximum Instantaneous Flow (Qi) (mgd)	Average Annual Withdrawal (Qa) (mgd)	
Lakehaven Wells	Ground Water	42.8	18.0	10.1
Kent Wells & Springs	Ground Water	40.3	25.9	17.0
Renton Wells	Ground Water	32.8	13.2	13.2
Auburn Wells & Springs	Ground Water	27.0	22.1	22.1

Source: 2001 Central Puget Sound Regional Water Supply Outlook

2.2.4 Smaller Sources of Water Owned by Public Water Systems

In addition to the large sources described above, many cities and special-purpose districts within King County own and operate local sources of supply. These range from very small wells that serve households in a single subdivision, to larger sources that deliver water to entire communities. Most of these sources consist of wells or springs tapping ground water, but a few include surface water diversions. Locations of wells owned and operated by Group A and Group B public water systems[5] are shown on Exhibits 2-2 and 2-3, respectively. From the map, it is apparent that some local supplies are

[5] For a description of the classification of public water systems, see Section 2.1.

located in areas that could be supplemented, if necessary, by larger regional supplies, as available. Other small supplies are located in areas more isolated from regional supplies (e.g., Vashon Island).

Some small supplies are located within the service area boundaries of larger systems. This means that portions of the service areas are not currently served by the larger utilities. These areas are served by small systems that are considered non-expanding and were not required to develop service area boundaries under the Coordination Act.

Additional detail on many of these sources is provided in subsequent sections of this report.

2.2.5 Individual Household Wells

Some homes in the County obtain water from individual household wells, not from public water systems. These individual household wells are often referred to as "exempt wells," because the State Water Code does not require the user to apply for a permit to withdraw water up to 5,000 gallons per day (certain other categories of water use are also included in this exemption)[6].

There is no specific documentation concerning the number of individual household wells that exist within the County. An analysis utilizing data from various sources was performed to develop an estimate of the number of such wells. Presented in Table 2-6, the analysis consists of subtracting the estimated number of single-family households served by all King County Group A Community and Group B water systems from the total number of single-family households within the County.

Table 2-6
Estimate of Individual Household Wells in King County

Total Number of Single-family Households (SFH) in County (1)	**462,567**
Less Number of SFH served by Public Water Systems (PWS):	
SFH served by all Group A Community PWS covered in Outlook (2)	(424,414)
SFH served by Group A Community PWS not covered in Outlook (3)	(9,078)
SFH served by Group B PWS (3)	(6,305)
Estimated Number of SFH with individual household wells	**22,770**

Footnotes:
(1) Based on PSRC data
(2) Based on analysis documented in Outlook Technical Memoranda. Includes estimate of 2,800 households served by Tacoma as retail customers in South King County (estimate provided by Tacoma staff).
(3) Based on DOH Water Facilities Inventory, with assumption that one connection is equal to one household (this assumption was only applied to small public water systems).

Based on this information, it is estimated that approximately 3 percent of the County population is served by individual household wells (see Section 2.4).

[6] The homeowner is exempt from the requirement to apply for a water right. There is no exemption from the requirement to obtain a permit for the drilling of the well.

2.2.6 Water Sources Associated with Self-Supplied Users

Many commercial and industrial facilities also have their own wells or surface-water intakes. These may be located either in urban or rural areas of the County. Depending on their status under DOH regulations[7], these self-supplied entities may or may not be regulated as public water systems. In addition, agricultural water users in King County frequently have their own sources of water that are distinct from any public water system.

How much water do these self-supplied entities use? How large is their demand for water relative to municipal demand from public water systems? Unfortunately, this is difficult if not impossible to answer. The quantity of water produced at self-supplied facilities is not well documented in King County (or in other areas of the State for that matter). While the Washington State Department of Ecology (Ecology) maintains a water rights database known as the Water Rights Application Tracking System (WRATS), this database does not contain enough information to answer the question.

- First of all, water rights represent the maximum authorized use of water, not actual consumption. The user may not be exercising the water right at all or may not be using the full right due to lack of demand, infrastructure limitations, sustainability issues, environmental concerns, or political constraints. Conversely, the user may be exceeding the allowable amount.
- Secondly, less than a quarter of the records in the database contain quantitative information on the size of the water rights. The database lists more than 14,500 water certificates, permits and claims located in King County. Neither annual nor instantaneous quantities are shown for any of the more than 11,000 claims. The records on the 3,500 water certificates and permits in King County provide information on instantaneous quantities but only 62% of these also show annual quantities.
- Supplemental water rights are not distinguished from primary rights in the database. This inflates the apparent size of water rights since supplemental rights are linked to primary rights but do not increase the amount of allowable withdrawn water.
- And finally, exempt wells (discussed in the previous section) are not included in the database since there is no permit process associated with their use.

(7) Appendix B contains a discussion of what constitutes a public water system and the regulations governing such systems.

So while it is clear that there are many claims on water resources in the County beyond those made by the public water systems, the magnitude of the demand represented by those non-municipal water rights is unknown.

2.2.7 Water-Resource Inventory Areas (WRIAs) in King County

For purposes of water-resource management, Ecology has divided the State into 62 Water-Resource Inventory Areas (WRIAs). King County contains at least a portion of four WRIAs:

- Snohomish (WRIA 7)
- Cedar/Sammamish (WRIA 8)
- Duwamish/Green (WRIA 9)
- Puyallup/White (WRIA 10)

All the maps (e.g., Exhibit 2-2) display the location of these WRIAs. Only the Duwamish/Green WRIA lies entirely within King County.

However, WRIA boundaries are being used in separate planning efforts in the context of the State Salmon Recovery Act (HB 2496) and the Watershed Planning Act (HB 2514) that may have an impact upon the availability of supplies. Once adopted, watershed plans that concern basins located within King County could potentially include provisions such as in-stream flow requirements that may affect the amount of water available to utilities. Such impacts will become more definable once watershed plans are adopted. Further information on WRIA planning activities is provided in Section 3.3.

2.3 Regional Organizations

Several entities and organizations in the County have regional responsibilities or objectives. These entities are all engaged in the Forum's Outlook process, and are likely to continue to play a role in evaluation, selection, and implementation of regional solutions. These organizations are discussed below.

2.3.1 Seattle Public Utilities

As discussed in Section 2.1, SPU serves as a regional wholesaler, delivering water to 26 cities and water districts, primarily in King County. SPU's surface and ground water sources were developed to serve a regional water supply function, and this is reflected in water rights, contractual arrangements, water-conservation programs, and other inter-governmental arrangements. SPU currently has individual contracts with each utility that purchases water. These contracts are due to expire in year 2012. However, SPU has entered into active negotiations with its current purveyors to develop new long-term contracts, and anticipates that these contracts will be completed and in place before the expiration date of the current agreements.

In fact, some of SPU's wholesale customers have already signed new contracts.

SPU has also had recent discussions with other potential customers. Issaquah and Covington are new wholesale customers that have recently signed contracts to get water from Seattle in the future. North Bend, Sallal, Ames Lake, Water District No. 111, and Sammamish Plateau are potential wholesale customers that have expressed interest in water from the Seattle system and are currently in the discussion stage with SPU. All of these utilities are identified in Section 5 as having potential water supply shortfalls prior to 2020. Purchase of water from SPU may likely be factored into the solutions these utilities develop. SPU's water system plan (WSP) accounts for these potential new demands (see Section 2.5).

2.3.2 Cascade Water Alliance

Cascade Water Alliance (CWA) is an association comprised of 11 water utilities that purchase water on a wholesale basis from SPU (see Table 2-7 for a list of members), either as their entire source or to supplement their own supplies. The mission put forth by CWA is "to provide water supply to meet current and future regional needs, develop and manage new water supply assets, purchase wholesale water from Seattle, provide regional conservation, and foster regional water planning." In keeping with this objective CWA is currently negotiating wholesale purchase contracts directly with SPU, on behalf of its members, and has also recently entered into a contract with Puget Sound Energy to pursue development of Lake Tapps as a water supply source.

Table 2-7
Regional Water Organizations Located within King County

Cascade Water Alliance (CWA)	
City of Bellevue	City of Mercer Island
Bryn-Mawr – Lakeridge Water & Sewer	City of Redmond Water System
Covington Water District	Sammamish Plateau Water & Sewer
City of Duvall	Tukwila Water Department
Issaquah Water System	Woodinville Water District
City of Kirkland	
Water Supply Association (WSA)	
Cedar River Water & Sewer District	King County Water District No. 111
Coal Creek Utility District	King County Water District No. 119
Highline Water District	King County Water District No. 125
King County Water District No. 20	Olympic View Water District
King County Water District No. 45	Sallal Water Association, Inc.
King County Water District No. 49	Shoreline Water District
King County Water District No. 85	Soos Creek Water & Sewer District
King County Water District No. 90	
East King County Regional Water Association	
Ames Lake Water Association, Inc.	City of North Bend
Cedar River Water & Sewer District	City of Renton
Coal Creek Utility District	River Bend Homeowners Association
Covington Water District	Sallal Water Association, Inc.
City of Duvall	Sammamish Plateau Water & Sewer
Fall City Water District No. 127	City of Snoqualmie
Issaquah Water System	Union Hill Water Association, Inc.
King County Water District No. 119	Wilderness Rim Association
NE Sammamish Sewer & Water District	
South King County Regional Water Association	
Algona Water Department	King County Water District No. 111
City of Auburn Water Division	Lakehaven Utility District
Black Diamond Water Department	City of Pacific
Kent Water Department	Soos Creek Water & Sewer District
Snohomish River Regional Water Authority	
City of Everett	Woodinville Water District
Northshore Utility District	

2.3.3 Water Supply Association

The Water Supply Association (WSA) also represents a group of water utilities that purchase water from Seattle. The 15 members are shown in Table 2-7. WSA differs from CWA in that its members will have individual contracts with SPU; in fact, some WSA members have already signed new contracts with SPU.

2.3.4 East King County Regional Water Association

The East King County Regional Water Association (EKCRWA) was formed during the 1980s to serve as a regional planning organization, particularly with reference to the East King County CWSP. The EKCRWA continues today as a forum for coordination and communications among its 17 members

(Table 2-7), and represents its members in regional discussions of water supply issues. Some of its members are also members of CWA or WSA. In addition, the EKCRWA has funded studies of the Snoqualmie Aquifer for potential development as a regional source of supply. This project is one of the regional water supply options examined by the Forum (see Section 4).

2.3.5 South King County Regional Water Association

The South King County Regional Water Association (SKCRWA) was also formed during the 1980s as a regional planning organization. It developed the South King County CWSP, and continues today as a forum for coordination and communications among its eight members (Table 2-7). In addition, it represents its members in regional discussions of water supply issues. Some of its members are also members of CWA or WSA.

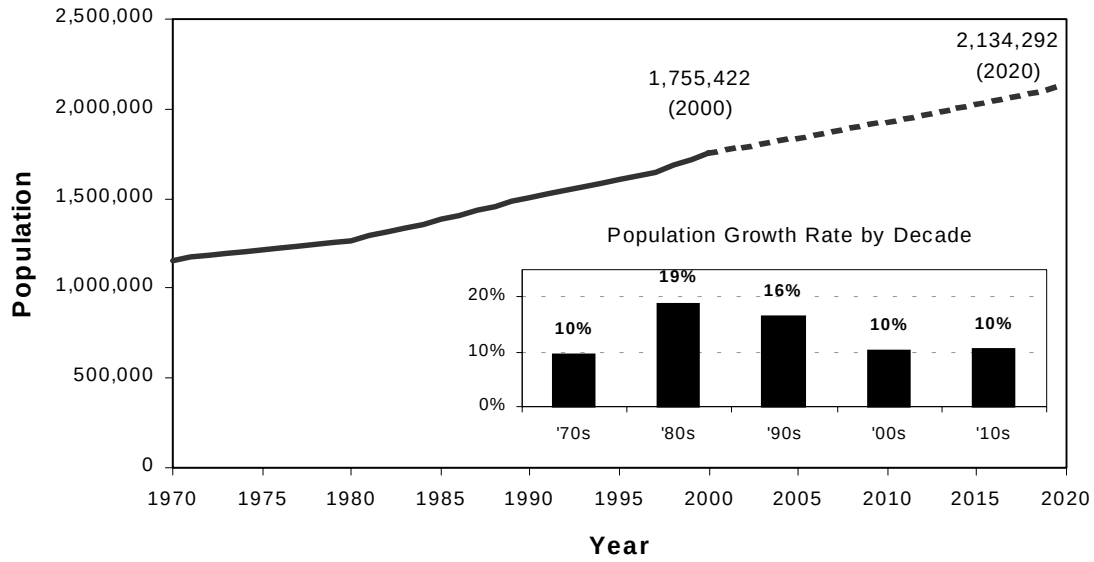
2.3.6 Snohomish River Regional Water Authority

The Snohomish River Regional Water Authority is comprised of Woodinville Water District, Northshore Utility District, and the City of Everett (the latter is in Snohomish County rather than King County). This organization was formed solely to plan, evaluate, and develop a water supply project involving utilization of an existing water right associated with the former Weyerhaeuser mill in Everett. This project would involve transmission of water across the County line from Everett (in Snohomish County) to Woodinville and Northshore Utility District (both in King County). This project is one of the regional water supply options examined by the Forum (see Section 4).

2.4 Current Demand and Population Served

King County has experienced significant growth in population and employment during the past 20 years, and this growth is projected to continue, though at a somewhat slower rate, in coming decades. Exhibit 2-7 shows historic and forecast growth in population for the County as a whole, based upon Puget Sound Regional Council (PSRC) 1998 forecasts. The County is expected to grow by 10 percent in each of the next two decades. Growth presents a challenge for water suppliers in some areas of the County, as it requires additional water supply, increased sharing of existing supplies, and/or reductions in consumption per person. Therefore, this section summarizes growth projections, with reference to the various sources of supply described in the preceding section.

Exhibit 2-7
Population Growth in King County
1970-2020



Source: Adapted from PSRC Data

Table 2-8 lists the estimated populations and percent of County population[8] served by different sources of supply. Exhibit 2-8 summarizes this information graphically and Exhibit 2-9 provides a map showing utilities grouped by supply categories. Seattle and its fully-supplied wholesale partners account for 35 percent and 29 percent of the County's population, respectively. Local sources of supply owned by other Group A water systems serve approximately 22 percent (for a discussion of Group A and Group B systems, see Section 2.1). This value includes Auburn and Tacoma supplies, broken out separately because these utilities serve as local wholesalers to other communities. An additional 10 percent of the County population receives water from both the Seattle sources and local supplies owned by individual purveyors.

There are 1,648 Group B water systems in the County, which collectively serve an estimated 1 percent of the population[9]. Individual household wells serve an estimated 3 percent of the County population.

[8] Although there are alternative ways to depict the share of the County served by different sources of supply, such as by land area served, the population-based approach was utilized for this report, due to ease and clarity of analysis. For a visual display of land area served, see Exhibit 2-2.

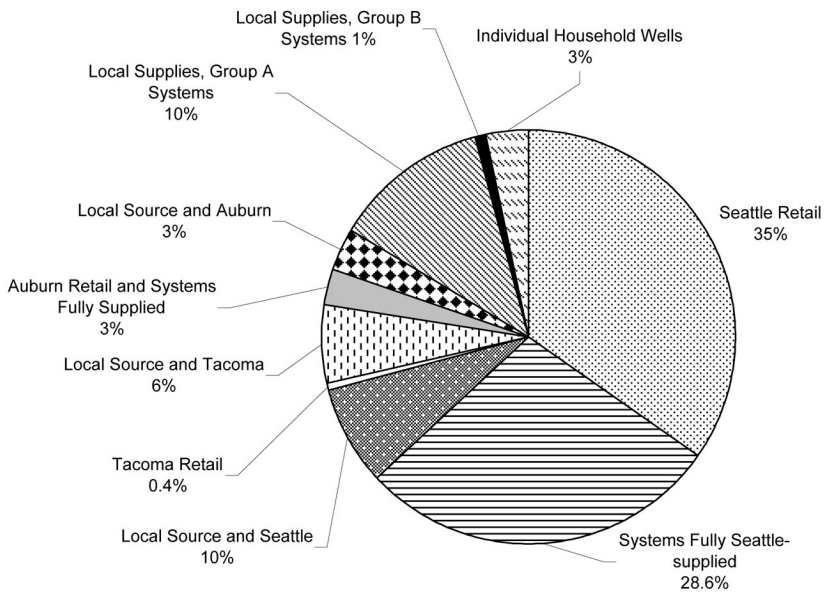
[9] Population served by small Group A systems, Group B systems, and individual household wells were estimated based on Outlook data. The figures used in this report are based on 2.54 people per household served by these categories. This is the average for King County as determined by the Outlook process.

Table 2-8
Population Served by Utilities in King County

Utility	2000 Pop Served	Share of County	2020 Pop. Served	% Growth to 2020
Seattle Retail				
Seattle	**607,871**	**34.6%**	**715,007**	**18%**
Fully Seattle Supplied	**499,505**	**28.5%**	**601,763**	**20%**
Bellevue	117,487	6.7%	137,160	17%
Bothell	12,170	0.7%	14,531	19%
Coal Creek	22,403	1.3%	28,828	29%
Duvall	4,157	0.2%	7,493	80%
King 119	3,197	0.2%	6,293	97%
King 125	13,537	0.8%	22,153	64%
King 20	31,056	1.8%	35,803	15%
King 45	13,663	0.8%	13,727	0%
King 49	13,370	0.8%	16,656	25%
King 85	1,494	0.1%	1,867	25%
King 90	14,372	0.8%	16,552	15%
Kirkland	34,666	2.0%	41,053	18%
Mercer Island	21,399	1.2%	21,548	1%
Northshore	63,431	3.6%	71,636	13%
Shoreline	25,550	1.5%	26,857	5%
Skyway	4,498	0.3%	5,184	15%
Soos Creek	53,253	3.0%	62,676	18%
Tukwila	6,831	0.4%	12,345	81%
Woodinville	42,971	2.4%	59,399	38%
Local Source of Supply, Group A Systems	**165,415**	**9.5%**	**210,958**	**28%**
Ames Lake	2,528	0.1%	4,304	70%
Black Diamond	2,479	0.1%	2,950	19%
Carnation	2,136	0.1%	2,690	26%
Fall City	3,313	0.2%	6,357	92%
Issaquah	10,063	0.6%	13,259	32%
Kent	50,404	2.9%	65,830	31%
King 1	312	0.0%	332	7%
King 54	3,280	0.2%	3,770	15%
Mirrormont	1,962	0.1%	2,459	25%
NE Sammamish	8,861	0.5%	11,388	29%
North Bend	4,905	0.3%	6,893	41%
River Bend	1,639	0.1%	2,294	40%
Sallal	3,770	0.2%	5,079	35%
Sammamish Plateau	37,795	2.2%	47,595	26%
Snoqualmie	4,381	0.2%	6,095	39%
Wilderness Rim	1,961	0.1%	2,746	40%
Group A Utilities Not Surveyed in Outlook	23,058	1.3%	24,211	5%
Local Source and Seattle	**184,875**	**10.5%**	**244,929**	**32%**
Bryn-Mawr	5,380	0.3%	7,627	42%
Cedar River	19,407	1.1%	23,785	23%
Highline	59,985	3.4%	72,755	21%
Lake Forest Park	2,569	0.1%	2,706	5%
Redmond	46,568	2.7%	69,481	49%
Renton	48,263	2.7%	62,359	29%
Union Hill	5,272	0.3%	8,922	69%
Local Source and Tacoma	**109,236**	**6.2%**	**138,217**	**27%**
Enumclaw	16,256	0.9%	18,716	15%
Lakehaven	92,981	5.3%	119,501	29%
Local Source and Auburn	**60,469**	**3.4%**	**75,756**	**25%**
Covington	39,031	2.2%	45,741	17%
King 111	14,947	0.9%	21,060	41%
Pacific	6,492	0.4%	8,955	38%
Auburn Retail and Systems Fully Supplied by Auburn	**47,190**	**2.7%**	**61,196**	**30%**
Algona	2,991	0.2%	4,016	34%
Auburn	44,199	2.5%	57,180	29%
Fully Tacoma Supplied				
Tacoma	**7,112**	**0.4%**	**9,032**	**27%**
Local Source of Supply, Group B Systems				
Group B Utilities	**16,015**	**0.9%**	**16,815**	**5%**
Local Source of Supply, Household Wells				
Individual Household Wells	**57,733**	**3.3%**	**60,620**	**5%**
County Total	**1,755,422**	**100%**	**2,134,292**	**22%**

Source: Outlook Phase 1 Apportionment, Table C-1

Exhibit 2-8
Population Served, Grouped by Source of Supply



Sources: For larger systems, data adapted from Regional Water Suppply Outlook. For smaller systems, estimates based on Water Facilities Inventory. For individual household wells, valued calculated for this report.

Exhibit 2-10 displays the relative growth rates of populations within the County, based on PSRC 1998 projections and categorized by water supply sources. The most rapidly growing segments of the County are projected to see growth rates of up to 34 percent over the 20-year period. These are primarily areas in East King County and South King County that are fully or partly supplied by local sources. Because of the more rapid growth in these areas, local sources will experience increasing pressure to meet projected needs. It should be noted that these growth projections were developed for regional planning purposes, and may not reflect all of the nuances of local development decisions.

The population currently served by purveyors that are fully supplied from the Seattle regional sources is projected to grow by 20 percent, while Seattle's retail population is projected to grow by 18 percent. Projections indicate that these components, though growing at a more moderate pace, will continue to represent over 60 percent of the County population in year 2020. Based on Seattle's most recent demand projections[10] and yield estimates, SPU has sufficient supply to meet demand beyond year 2020.

[10] SPU's demand forecast is described in more detail in Section 2.5.

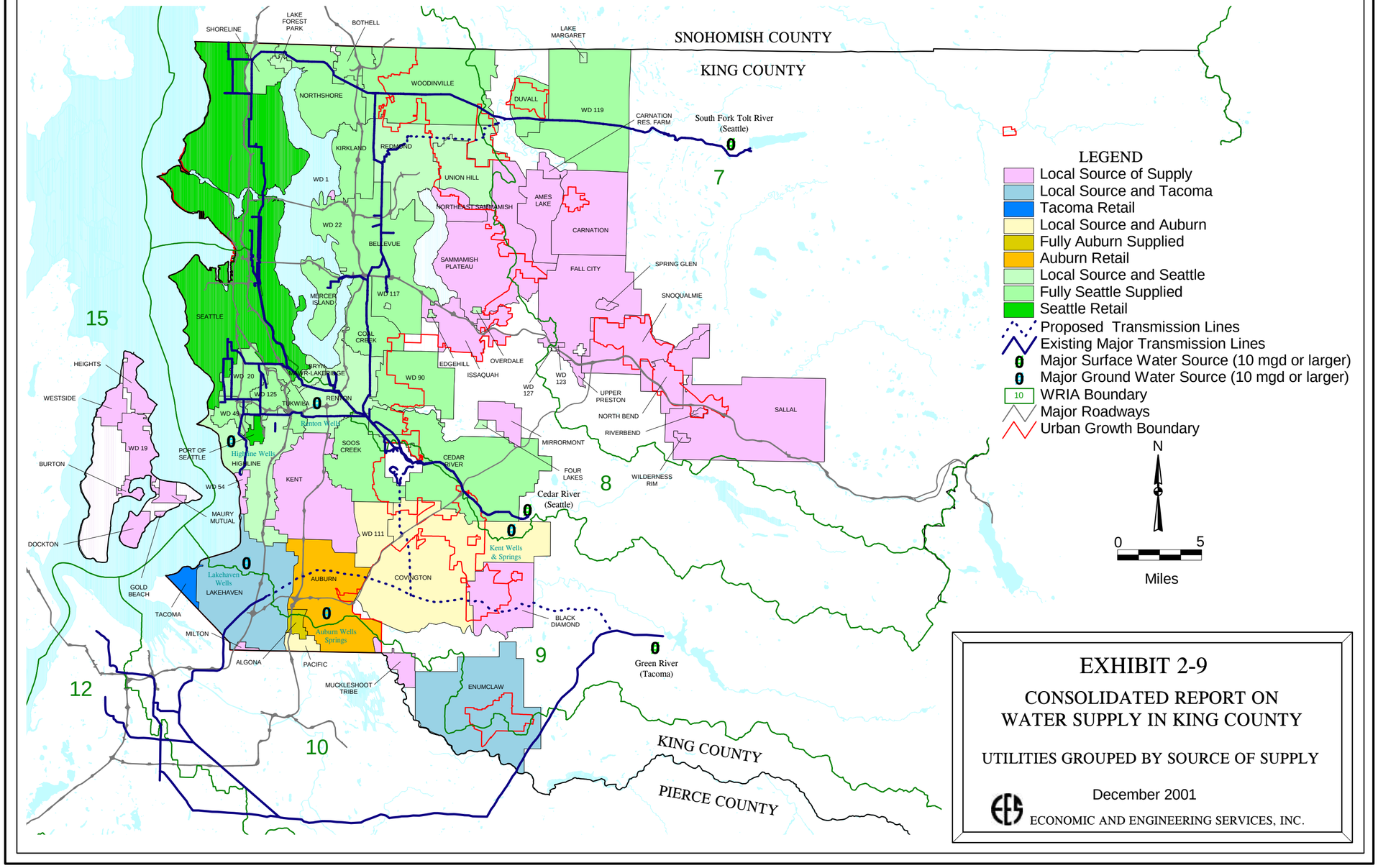


EXHIBIT 2-9

CONSOLIDATED REPORT ON WATER SUPPLY IN KING COUNTY

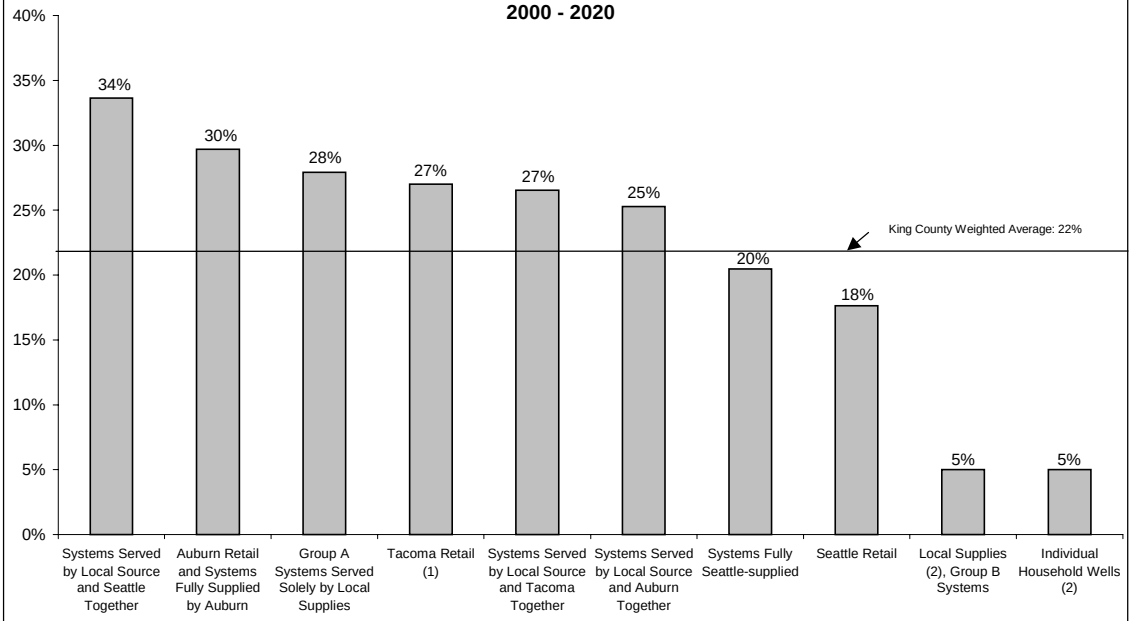
UTILITIES GROUPED BY SOURCE OF SUPPLY

December 2001

ECONOMIC AND ENGINEERING SERVICES, INC.

The slowest growing segments of the population are those served by Group B public water systems and individual household wells. This is partly because although many new Group B systems and individual wells are expected in coming decades, many existing ones are expected to continually be absorbed into Group A systems. These assumptions were utilized in the Outlook, and are based on the concept of water utilities planning under the Public Water Supply Coordination Act having the authority and responsibility of providing service throughout their entire service areas, except where viable small systems are currently existing or where provision of service cannot be made to new developments in a timely and reasonable fashion (also see Table 7-1 for details for King County policies regarding provision of service to new development in the County). Another cause is the difficulties Group B systems may experience difficulty addressing increased regulatory requirements and deteriorating infrastructure. Therefore, the overall population served by these categories is expected to grow more slowly than other categories of supply.

Exhibit 2-10
Variation in Population Growth Rate, by Source of Supply
2000 - 2020



Source: Adapted from Regional Water Supply Outlook.
(1) A small area in southwest King County is served by Tacoma.
(2) Growth rate assumed based on Outlook projections. Includes assumption that though new Group B systems and individual wells will be installed, some existing ones will be absorbed into Group A systems.

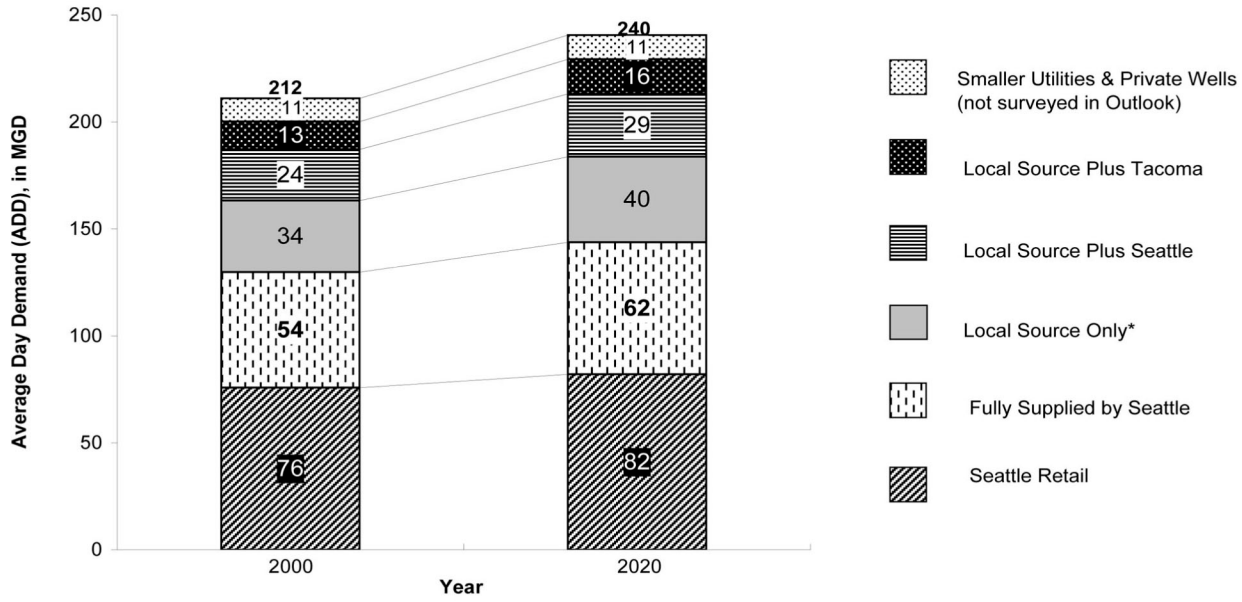
2.5 Projected Demand and Population Served

Exhibit 2-11 presents the "baseline" King County demand forecast from the Outlook from year 2000 to 2020. The "baseline" projection takes into account population growth in the region, conservation measures that were implemented during the

1990s, and expected reductions in water usage due to the 1993 State plumbing code. The "baseline" projection does not include additional conservation programs currently being undertaken by water utilities in the County (e.g., the 1 Percent Conservation Program). Therefore, the "baseline" forecast is a conservative, "worst-case" estimate of future demands. Additional conservation programs are currently being developed by utilities and are discussed further in Section 4.1.

Demands shown in Exhibit 2-11 have been distributed among the source categories described previously. The forecast indicates that, without accounting for further conservation activities, average day demand (ADD) would rise from 212 mgd in year 2000 to 240 mgd in year 2020. This is an increase of 13 percent. The largest shares of demand are projected to continue to be Seattle and the purveyors that are fully supplied by Seattle.

Exhibit 2-11
Current and Projected Average Day Demand (ADD), Grouped by Source of Supply
Shown in Millions of Gallons per Day (MGD)



* This includes utilities that rely entirely on their own sources plus those that buy some or all of their water from subregional (rather than regional) suppliers such as Auburn.

Source: Adapted from Regional Water Supply Outlook, Phase 1.

Peak day demand is also important in understanding future needs for water. The Outlook forecast of baseline peak day demand in King County projects an increase from 429 mgd in year 2000 to 489 mgd in year 2020 (an increase of 14 percent).

These figures indicate that demand for water is projected to increase at a slower rate than population in the County (see Table 2-8, showing a projected population increase of 22 percent). This difference is due to the treatment of conservation in the

Outlook's "baseline" demand forecasts. For the King County area, the Outlook's baseline forecast projects 36 mgd of average day demand reductions from 1997 to 2020, due to the water-efficient plumbing fixtures required in the 1993 plumbing code. This reduces demand projections well below what they would be otherwise.

Due to the complexity involved in projecting conservation savings regionally, the Outlook "baseline" demand forecasts do not take into account additional reductions that are expected to be realized through water-conservation programs implemented by utilities (including the 1% Conservation Program undertaken by Seattle and its wholesale purveyors in King County). In addition, the baseline forecasts do not account for other demographic factors, such as changes in average household size as the ratio of multifamily housing to single-family housing increases; changes in income levels; etc. However, during Phase 2 of the Outlook, conservation scenarios were developed for the region. These are discussed in Section 4 of this report and would result in reductions from the baseline demand forecasts.

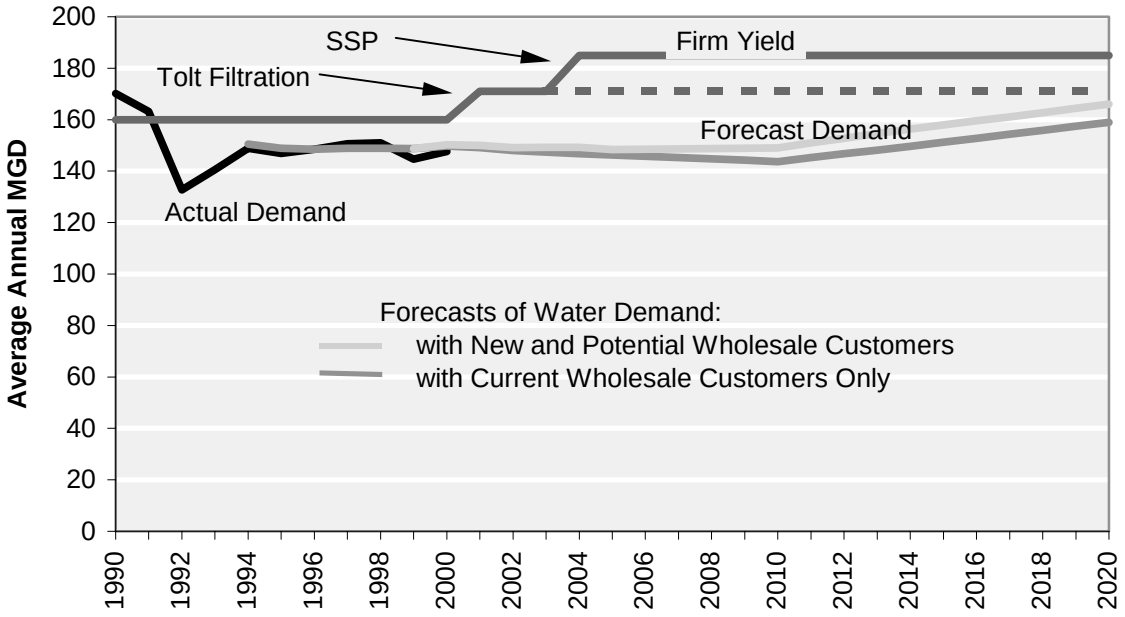
SPU has developed its own, more detailed forecast of demand through 2020. Exhibit 2-12 reflects the most recent forecast from SPU's 2001 Water System Plan. The demand forecast is based on implementation of the 1% Conservation Program by retail and wholesale customers through 2010. Additional "cost-effective" conservation, as outlined in SPU's Conservation Potential Assessment (CPA), is assumed to be implemented by retail customers beyond 2010. This commitment is not assumed for SPU's wholesale customers, for whom the demand forecast reflects no new conservation programs after 2010. Recently, the City of Seattle has agreed to further accelerate conservation investment in response to Initiative 63. (The initiative was removed from the ballot after the City adopted many of its provisions.) However, the estimated impact of conservation associated with the Initiative 63 settlement has yet to be incorporated into the demand forecast. This added conservation would, of course, be expected to further reduce demand.

Two demand forecasts are shown in Exhibit 2-12. The lower forecast includes SPU's future demands associated with retail and current wholesale customers. The higher forecast includes those demands, as well as demands associated with new, potential wholesale customers. Utilities identified by SPU as potential new customers include Ames Lake, Covington, Issaquah, North Bend, Sallal, Sammamish Plateau, and Water District 111.

Comparison of these demand forecasts with the firm yield of SPU's sources of supply indicates that SPU has adequate supply to meet projected demand through year 2020. After year 2020, adequacy of supply depends on availability of the Tacoma Second Supply Project, and assumptions regarding conservation. As mentioned previously, in the context of SPU's sources of supply, firm yield refers to the maximum level of annual average demand (taking into account the seasonal peaking profile of that demand) a utility's source(s) can meet on a reliable and sustainable basis.

The SPU forecast differs from the Outlook forecasts in three important respects. First, the SPU forecast accounts for the 1% Conservation Program, which is expected to reduce per capita demand 1 percent per year over a 10-year period. Second, this forecast accounts for more detailed demographic trends affecting demand for water within the Seattle retail and wholesale service areas. Third, this forecast covers the demand for the City of Seattle and all of Seattle's wholesale customers, but only for that portion of demand served by water produced by the Seattle sources of supply. It does not include water consumed by Seattle wholesale customers but produced by their own local sources. As a result of these differences, the SPU forecast is not directly comparable to the Outlook forecasts. Both the Outlook and SPU forecasts should be considered in evaluating King County conditions.

Exhibit 2-12
Firm Yield Estimates and Forecasts of Water Demand for SPU Regional System
(in Average Annual MGD)



Source: SPU staff, April 2001
SSP = Tacoma Second Supply Project (Seattle is a partner in that project)